

**REMARKS**

This is in response to the Office Action dated December 29, 2005. Non-elected claims 10-16 have been canceled, without prejudice in view of the Restriction Requirement. New claims 22-28 have been added. Thus, claims 1-2, 4-9 and 17-28 are now pending.

The undersigned would like to thank the Examiner for the courtesy extended during the interview held at the USPTO on April 11, 2006. The substance of the interview is set forth herein.

**Claims 24-26**

During the interview, the Examiner agreed that new claims 24-26 would define over the cited art. In particular, new claims 24-26 state that *“the penetration electrode extends through the aperture section of the pad electrode so that the penetration electrode is located at elevations both above and below the pad electrode.”* For example and without limitation, Fig. 1 of the instant application illustrates that penetration electrode 15 extends through the aperture section of the pad electrode 4 so that the penetration electrode 15 is located at elevations both above and below the pad electrode.

Finnila fails to disclose or suggest the above feature of claims 24-26. The Office Action relies on Fig. 6 of Finnila. However, in Figs. 6-7 of Finnila the alleged penetration electrode 21 clearly does not extend “through” an aperture section of the alleged pad electrode 23, 32; and also the alleged penetration electrode 21 is not located at elevations both above and below the pad electrode, as required by new claims 24-26. The Examiner agreed during the interview that Finnila fails to disclose or suggest this feature. Thus, it is respectfully submitted that claims 24-26 contain allowable subject matter.

Claim 1

Claim 1 stands rejected under Section 102(b) as being allegedly anticipated by Finnila. This Section 102(b) rejection is respectfully traversed for at least the following reasons.

Claim 1 as amended requires “a *pad electrode, having an aperture section formed therethrough, the pad electrode being formed over the field oxide film so as to overlap the field oxide film when perpendicularly viewing the semiconductor substrate*; and a penetration electrode electrically connected to the pad electrode, the *penetration electrode being provided so as to pass through each of (a) the aperture section of the field oxide film, (b) a hole formed in the semiconductor substrate, and (c) the aperture section of the pad electrode*, the hole in the semiconductor substrate being formed entirely within the aperture section of the field oxide film, when perpendicularly viewing the semiconductor substrate, so that an opening of the hole is smaller than the aperture section of the field oxide film.” For purposes of example and without limitation, Fig. 1 of the instant application illustrates a pad electrode 4 formed over the field oxide film 2 so as to overlap the field oxide film 2 when perpendicularly viewing the semiconductor substrate, and a penetration electrode 15 electrically connected to the pad electrode 4. In example Fig. 1, the penetration electrode 15 is provided so as to pass through each of (a) the aperture section of the field oxide film 2, (b) a hole formed in the semiconductor substrate 1, and (c) the aperture section of the pad electrode 4.

Finnila fails to disclose or suggest the aforesaid quoted features of claim 1, for several reason discussed below.

*First*, in contrast to amended claim 1, Finnila fails to disclose or suggest the *penetration electrode being provided so as to pass through an aperture section of the pad electrode*. In Figs. 6-7 of Finnila, the alleged penetration electrode 21 does not pass “through” any aperture section

defined in the alleged pad electrode 23, 32. During the interview, the Examiner alleged that the word “via” in the previous claims was broad and was not limited to passing through. Thus, claim 1 has been amended to remove “via” and instead limit the claim to the penetration electrode passing “through” an aperture section of the pad electrode. Furthermore, Finnila fails to disclose or suggest a pad electrode with an aperture section “formed therethrough” as recited in the context of claim 1. Finnila does not disclose or suggest this feature, and is entirely unrelated to the invention of claim 1 in this regard.

*Second*, amended claim 1 requires the “*pad electrode being formed over the field oxide film so as to overlap the field oxide film when perpendicularly viewing the semiconductor substrate.*” Again, Finnila fails to disclose or suggest this feature of claim 1. In Figs. 6-7 of Finnila, the alleged pad electrode 23, 32 does not overlap the alleged field oxide film 13 when perpendicularly viewing the semiconductor substrate. Instead, Finnila teaches directly away from this feature of claim 1 because in Finnila the alleged pad electrode 23, 32 is laterally spaced apart from and does not overlap the alleged field oxide film 13 as evidenced by Fig. 6 of Finnila.

*Third*, neither the left alleged penetration electrode 21 nor the right alleged penetration electrode 21 in Fig. 6 of Finnila meets both: (i) the pad electrode being formed over the field oxide film so as to overlap the same when perpendicularly viewing the semiconductor substrate, and (ii) the hole in the semiconductor substrate being formed entirely within the aperture section of the field oxide film, when perpendicularly viewing the substrate, so that an opening of the hole is smaller than the aperture section of the field oxide film” as recited in claim 1. Fig. 6 of Finnila teaches directly away from these features because the right alleged pad electrode 21 in Fig. 6 of Finnila does not meet (i) and the left alleged pad electrode 21 does not meet (ii).

For each of the aforesaid three reasons, Finnila fails to meet the invention of amended claim 1;

Claim 2

Claim 2 requires that the penetration electrode is formed in a field area of the surface of the semiconductor substrate. Finnila fails to disclose or suggest this feature. The “field area” is clearly defined in the instant specification (e.g., pg. 4, third paragraph). In particular, the instant specification defines a “field area” as “an area where no semiconductor element is provided” (pg. 4, third paragraph). In other words, claim 2 requires that the penetration electrode is formed in an area where no semiconductor element is provided. Finnila fails to disclose or suggest this feature.

Finnila’s alleged penetration electrode 21 is clearly not in an area where no semiconductor element is provided as required by claim 2. The Office Action contends that the right electrode 21 in Fig. 6 of Finnila corresponds to the claimed penetration electrode. However, the right electrode of Finnila is in an active region, not in a field region or area (see col. 3, lines 45-55; and Figs. 3-6 of Finnila). Finnila clearly identifies the active area and the field region, and states that trench 14a (corresponding to the right electrode of Finnila) is in the active area (and therefore not in the field area as these are mutually exclusive) (see Finnila at col. 3, lines 47-49). Therefore, Finnila expressly states that the right electrode 21 in Fig. 6 is not in a field area. Thus, it will be appreciated that Finnila fails to disclose or suggest that the penetration electrode is formed in a field area of the surface of the semiconductor substrate as required by claim 2.

Claim 18

Claim 18 requires “pad electrode formed over the field oxide film so as to *overlap the field oxide film when perpendicularly viewing the semiconductor substrate*; wherein: the pad electrode has an *aperture section formed therethrough*, the penetration electrode is electrically connected to the pad electrode, the *penetration electrode being provided so as to pass through each of the aperture section of the field oxide film, a hole formed in the semiconductor substrate, and the aperture section of the pad electrode*, the hole being formed entirely within the aperture section of the field oxide film, when perpendicularly viewing the semiconductor substrate, so that an opening of the hole is smaller than the aperture section of the field oxide film; and the penetration electrode being formed in a field area of the surface of the semiconductor substrate. Finnila fails to disclose or suggest the aforesaid italicized features of claim 18.

Claim 18 further requires the penetration electrode being formed in a *field area* of the surface of the semiconductor substrate. As explained above with respect to claim 2, Finnila fails to disclose or suggest this feature.

Claim 19

Claim 19 requires “a pad electrode, having an *aperture section formed therethrough*, the pad electrode being formed over the field oxide film so as to *overlap the field oxide film when perpendicularly viewing the semiconductor substrate*; wherein: the penetration electrode is electrically connected to the pad electrode, the *penetration electrode being provided so as to pass through each of the aperture section of the field oxide film, a hole formed in the semiconductor substrate, and the aperture section of the pad electrode*, and the hole being formed entirely within the aperture section of the field oxide film, when perpendicularly viewing the semiconductor substrate, so that an opening of the hole is smaller than the aperture section of

the field oxide film. Finnila fails to disclose or suggest the aforesaid italicized features of claim 19.

Claim 17 requires that “*the pad electrode is formed so that there is no overlap with the hole when perpendicularly viewing the semiconductor substrate.*” For purposes of example and without limitation, Fig. 1 of the instant application illustrates that pad electrode 4 is formed so that there is no overlap with the hole formed in the semiconductor substrate 1 when perpendicularly viewing the substrate. Finnila fails to disclose or suggest this feature. In particular, in Figs. 6-7 of Finnila the alleged pad electrode 23, 32 overlaps the hole in the alleged semiconductor substrate 12, which is precluded by claim 17. Thus, it will be appreciated that Finnila fails to meet the invention of claim 17 in this respect.

Moreover, claim 17 recites “the” pad electrode and “the” hole in the semiconductor substrate (note that the penetration electrode must pass through this same hole in the semiconductor substrate and also must pass through the aperture section in this same pad electrode as recited in claim 1 from which claim 17 depends), thereby preventing the Examiner from mixing and matching different alleged electrodes and holes.

#### Claim 22

Claim 22 requires “the insulating film is in direct contact with the field oxide film.” Finnila fails to disclose or suggest the invention of claim 22. Clearly, the alleged insulating film 15 in Fig. 4 of Finnila is not in directly contact with the alleged field oxide film 13 as required by claim 22.

#### Claim 28

Claim 28 requires (i) a pad electrode formed over the field oxide film so as to overlap the field oxide film when perpendicularly viewing the semiconductor substrate; and (ii) the hole in

the semiconductor substrate is formed entirely within the aperture section of the field oxide film, when perpendicularly viewing the semiconductor substrate, so that an opening of the hole is smaller than the aperture section.

Neither the left alleged penetration electrode 21 nor the right alleged penetration electrode 21 in Fig. 6 of Finnila meets both: (i) the pad electrode being formed over the field oxide film so as to overlap the same when perpendicularly viewing the semiconductor substrate, and (ii) the hole in the semiconductor substrate being formed entirely within the aperture section of the field oxide film, when perpendicularly viewing the substrate, so that an opening of the hole is smaller than the aperture section of the field oxide film” as recited in this claim. Fig. 6 of Finnila teaches directly away from these features because the right alleged pad electrode 21 in Fig. 6 of Finnila does not meet (i) and the left alleged pad electrode 21 does not meet (ii).

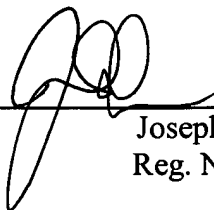
#### Conclusion

It is respectfully requested that all rejections be withdrawn. All claims are in condition for allowance. If any minor matter remains to be resolved, the Examiner is invited to telephone the undersigned with regard to the same.

DOTTA et al  
Appl. No. 10/828,475  
July 18, 2006

Respectfully submitted,

**NIXON & VANDERHYE P.C.**

By:  \_\_\_\_\_  
Joseph A. Rhoa  
Reg. No. 37,515

JAR:caj  
901 North Glebe Road, 11th Floor  
Arlington, VA 22203-1808  
Telephone: (703) 816-4000  
Facsimile: (703) 816-4100